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7(2) S. UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Plant Industry, Soils,
and Agricultural Engineering,

7a H. T. & S. Office Report No. 274) //

3 Influence of Pads and Car Lining on Potato
Transit Temperatures,
East Grand Forks, Minn. to Chicago, Ill.,
January, 1952 // +

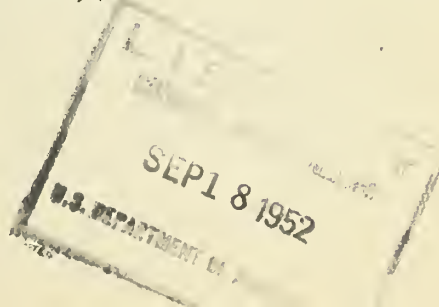
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Report of a study made under the
Research & Marketing Act of 1946
RM: c-320

East Grand Forks, Minnesota
April 30, 1952



INFLUENCE OF PADS AND CAR LINING ON
POTATO TRANSIT TEMPERATURES
JANUARY 1952

These studies are a continuation of those reported in H. T. & S. Office Report No. 2511/, the general object being to develop satisfactory methods of protecting potatoes from freezing in transit during very cold weather. The present investigation was undertaken to determine the value of floor pads and two types of car lining on potato temperatures in both fan and non-fan cars.

EXPERIMENTAL EQUIPMENT AND PROCEDURE

The list of test cars together with the padding, car lining treatment and other car loading data are given in table 1. There was one fan car and one non-fan car for each of the 4 treatments involving car lining or floor rack pads.

Test Cars

The Northern Refrigerator Line (NRC) cars used in the tests were all standard end bunker cars containing $3\frac{1}{2}$ to 4 inches of insulation in the floors, 4 to $4\frac{1}{2}$ inches in the roofs, $3\frac{1}{2}$ inches in the sides and $4\frac{1}{2}$ inches in the ends. They were fairly old cars without side wall flues and were in fair condition.

The Northern Pacific Railroad (NP) cars used in the tests were all recently built fan cars containing $4\frac{1}{2}$ inches of insulation in the floors, 4 to $4\frac{1}{2}$ inches in the roofs and 4 inches in the sides and ends. All of these fan cars were equipped with side wall flues.

No attempt was made to have the fan cars comparable with the non-fan cars as the purpose of this study was to determine the value of pads and car lining in fairly old non-fan cars and in fairly new fan cars. The non-fan cars were all comparable with each other and likewise the fan cars were all comparable with each other.

It was intended to have all bunker drains open but upon arrival in Chicago it was discovered that a few of the drains were plugged with waste or hairfelt and several others had iced up so that they were closed. (table 11). The results reported in H. T. & S. Office Report No. 2412/ indicated that commodity temperatures are probably not influenced by the drains being open or closed.

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- 1/ "Influence of Loading Temperatures of Potatoes, Type and Number of Heaters and Type of Car on Potato Transit Temperatures, January, 1951"
 - 2/ Transportation Test of Heaters in Refrigerator Cars with Bananas. New Orleans to Winnipeg - January, 1951.

Heaters

One portable charcoal heater was used in each bunker. NP heaters were used from East Grand Forks to Minneapolis, Minnesota. These were standard 2-piece 16-inch Klauer heaters with 20 pound capacity. At Minneapolis, Soo Line heaters were installed. These had been lit 1 to 2 hours before installing. They were 1-piece 14 and 16-inch Simplex heaters, some with 20 and some with 30-pound fuel capacity.

Commodity and Air Temperatures

Distance reading electric resistance thermometers were used to obtain ten commodity and two air temperatures in each car. The twelve thermometer bulbs were placed at the following positions:

| <u>Position</u> | <u>Designation</u> |
|--|--------------------|
| Top quarter length center line, head and rear (potato) | TQCL-H, TQCL-R |
| Bottom bunker west side, head and rear (potato) | BBWS-H, BBWS-R |
| Bottom quarter length west side, rear (potato) | BQWS-R |
| Bottom doorway west side, head and rear (potato) | BDWS-H, BDWS-R |
| Bottom doorway center line, rear (potato) | BDCL-R |
| Bottom bunker east side, rear (potato) | BBES-R |
| Bottom doorway east side, rear (potato) | BDES-R |
| Bottom bunker west side, rear (air) | BBWS-AIR |
| Bottom doorway west side, rear (air) | BDWS-AIR |

Since the danger of freezing damage is greatest in the layer resting on the floor, thermometers were inserted in bottom layer potatoes in contact with the outside of the sack in order to detect dangerously low temperatures. The temperatures were taken on the side of the sack adjacent to the sidewall. The doorway potato temperatures were taken in the portion of the bag closest to the door hinge. The bunker potato temperatures were taken in the horizontal bag nearest the bunker. The top temperatures were obtained by inserting thermometers in the uppermost potatoes of the load. Air temperatures were read at the bunker and doorway positions just above the floor racks adjacent to the side of the sack next to the wall.

Loading and Routing

The cars were preheated for about a day with alcohol heaters placed in the loading space of the cars and then the day before loading the charcoal heaters were lit. The cars were all loaded between 9:00 AM and 4:45 PM on January 26.

The load used was a modification of the "pyramid through load" recommended by the Freight Container Bureau of the Association of American Railroads for winter shipment of potatoes^{3/}. In the standard 450 bag load, 6

^{3/} Recommended Arrangement for Loading 45,000 Pounds of Potatoes in 100 Pound Bags by the "Pyramid Through Load" Method. Ass'n. of Amer. Railroads Freight Container Bureau Bul. 43, Dec. 1, 1942

bags are placed upright across the car at each bunker, then double stacks in which the bags are placed both crosswise and lengthwise of the car to tie the load together. The first four layers contain 6 bags each, then two layers of 5 bags with a top layer of 4 bags. This gives a pyramid effect, keeping the bags from contact with the side wall. There are 10 such double stacks which fills the car except for the doorway where 58 bags are placed crosswise of the car in two rows. This type of loading is referred to as a 6-6-6-6-5-5-4 load, which refers to the number of bags in each layer of the double stacks as previously described. While it was intended to load all the cars alike it was not possible, unfortunately. Six of the test cars contained only 400 bags and they were loaded in a modification of the "pyramid". Five bags were placed across the ends, a 6-6-6-6-5-4-2 stack was used with 40 bags in the doorway. The 360 bag load was placed in a 6-6-6-5-4-4 pattern with 5 at each bunker and 40 in the doorway. Only one car was loaded with 450 bags and that did not follow the exact pattern. This was a 6-6-6-6-5-4-4-2 load, 5 at each end and 50 in the doorway. The extra tier of 2 bags placed them in contact with the ceiling, which not only complicated loading but restricted air circulation as well.

The test train departed on January 27 at 8:55 PM. The cars were routed from East Grand Forks to Minneapolis, Minnesota, via the Northern Pacific Railroad and to Chicago, Illinois, via the Minneapolis, St. Paul and Sault Ste. Marie Railroad (Soo Line). Total elapsed time for the trip was 54 hours and 30 minutes of which 24 hours and 5 minutes (44.2 percent) was running time and 30 hours and 25 minutes (55.8 percent) was standing time. See table 2 for trip log.

DISCUSSION OF RESULTS

Outside temperatures during loading ranged from -2 to -4°F. after which the weather became colder, especially during all but the last part of the transit period. A minimum of -32° was reached January 27 at 11:00 PM. Wind velocity during loading and the transit period was generally low. The temperatures during loading were somewhat below normal for the Red River Valley and the transit temperatures were much below normal. Therefore, this was quite a severe test as far as temperature was concerned.

The potato and air temperatures in the 8 cars during the transit period are given in tables 3 to 10 inclusive. Heater records and inspections of drains at destination are given in table 11. Average bottom temperature for non-fan and fan cars are charted in figures 1 and 3 and minimum temperatures in figures 2 and 4. Average top and bottom temperatures in fan and non-fan cars are charted in figure 5.

Floor Rack "Tufflex" Blanket Pads

While there was comparatively little difference between any of the treatments, the cars containing the blanket pads only had the lowest average bottom potato temperatures upon arrival at Chicago. When these pads were used in conjunction with either the paper floor lining or the wood fiber strips, temperatures were slightly higher. In comparing pads only with paper only, cars 1 and 7, and cars 2 and 8, in figures 1 and 3, the pads show less protection against cold. This would indicate that a protective liner is

more effective when placed directly on the floor and up the sides and across the doors, where it will prevent loss of heat from the car than when placed on the floor racks only. Although the amount of bruising was not determined, previous tests have shown that this type of pad materially reduces transit bruising.

Kraft Paper Car Lining

Papering under the floor racks and up the sidewalls seems to have resulted in somewhat warmer bottom layer temperatures in both the fan and non-fan cars, particularly during the day before arrival at Chicago (car 2 in figure 1 and car 1 in figure 3) than in the other treatments. While it is true that the non-fan car started with slightly warmer potatoes at loading, it maintained this advantage throughout the transit period showing at least equal performance with the other materials. Minimum temperatures in this car upon arrival were over 4 degrees higher than in any of the other non-fan cars (figure 2). The use of the floor rack pads in conjunction with the papering did not result in any warmer temperatures in the load as compared with paper lining alone (car 4 in figure 1, and car 3 in figure 3).

All of these cars were apparently in very good condition both as regards insulation and tightness as reflected in the good temperatures maintained throughout the test. If the cars were not in good condition it is possible that more benefit from papering would have been observed.

Wood Fiber ("Tufflex") Strips Along Wall and Over Door Openings

It was thought that placing these paper-backed strips from the outside floor rack joist along the floor and up the wall about 18 inches and also over the door openings might be of value by supplying a "windbreak" and additional insulation at critical points. This treatment plus the "Tufflex" floor rack pads was used in car 5 (fan) and car 6 (non-fan).

As shown in figures 1 and 2, car 6 was no better than car 2 which had paper only. The performance of fan car 5 as compared with car 1, paper only, was similar. It should be noted, however, that the "Tufflex" lining was quite wet when the cars were opened for loading due to moisture from condensation on the car which was built up during the car warming period.

Influence of Fans

Figure 5 gives the average top and bottom temperatures for all fan and non-fan cars. As has been shown by many previous tests, there was less temperature spread in the fan than in the non-fan cars after departure of the train, with the bottom temperatures in the fan cars being consistantly warmer than the same position in the non-fan car.

Heaters

Since outside air temperatures were below 10°F. throughout the test, Carriers Protective Service (CPS) rules called for both heaters burning continuously. The charcoal heaters performed satisfactorily, except as listed below, and provided adequate heat for the transit period to market. The re-

cord of their performance is given in table 11. In car 2, one heater was found to be out when inspected at Staples and St. Paul, Minnesota. One heater in car 6 and one in car 8 were found to be out on inspection at St. Paul.

The fuel consumption in heaters in the fan cars was generally greater than that in the non-fan cars, table 11, which may account for slightly higher average commodity temperatures in the fan cars. Both heaters in the fan cars used about equal amounts of fuel while the rear heater in the non-fan cars generally showed a greater consumption than the heaters in the head end.

Comparison with 1951 Results

Outside air temperatures averaged about the same in 1951 (H. T. & S. Office Report No. 251) as those encountered in this test in 1952. However, potato transit temperatures in the 1952 tests were considerably higher than in those cars in 1951 which had two charcoal heaters per car. In 1951 dangerously low temperatures were encountered in one of the two non-fan cars which had only two charcoal heaters per car. There are three possible explanations for the difference in potato transit temperatures in 1951 and 1952:

1. The type and placement of liners may have been more effective.
2. The non-fan cars used both years were old, but those used in 1952 were apparently in better condition either in dryness of insulation or tightness, or both. It was observed in 1951 that even in cars which were apparently in the same condition, that there were differences in their ability to protect potatoes from freezing.
3. There was apparently at least twice the wind velocity in 1951 as in 1952. During the standing period in East Grand Forks and Grand Forks, wind velocities in 1951 ranged from 5 to 21 MPH, with an average of 16, and in 1952 the velocities ranged from 1 to 15, with an average of 8. During transit, detailed wind velocities were not obtained but an approximation made from the daily weather maps indicates that the velocities during transit in 1951 ranged from about 13 to 17 MPH and in 1952 from 0 to 7.

CONCLUSIONS

Although satisfactory potato temperatures were obtained in all cars, slightly higher temperatures prevailed in the fan cars which contained paper only underneath the floor racks and up the sidewalls about 3 feet. Paper backed wood fiber strips along the floor and walls of the cars where the floor joins the sidewalls, and over the door openings, were about equal to papering. Apparently either of these 2 treatments would be of some value in protecting potatoes from freezing. Blanket pads on the floor racks offered the least protection against cold (but doubtless were effective in reducing the amount of floor bruising).

Although there were no dangerously low temperatures in any of the cars in this test, the problem of protecting potatoes from freezing in transit

in commercial shipments from the Red River Valley still exists, as a fairly high number of cases of freezing during severe weather have been reported by shippers during the 1951-52 shipping season. On the other hand, this test shows that burning 2 charcoal heaters per car is adequate in good cars with some type of paper lining in very cold (but fairly calm) weather.

Acknowledgements

The authors are indebted to the following individuals and companies whose cooperation and assistance helped make this test possible:

Fred Fischer of the Northern Pacific Railroad for selecting and preparing the cars and servicing them in East Grand Forks and en-route to Minneapolis.

Elmer Broderick and E. L. Gronbeck of the Northern Pacific Railroad for making arrangements for loading and handling the test cars in East Grand Forks.

The Northern Pacific Railroad and the Northern Refrigerator Car Company for furnishing the test cars.

The Northern Pacific Railroad and the Minneapolis, St. Paul and Sault Ste. Marie Railroad for handling the test train and furnishing business cars.

Richard Bremicker, Grand Forks, North Dakota, and the Wood Conversion Company, St. Paul, Minnesota, for furnishing the wood fiber pads and strips.

The test was made possible by the following growers and shippers who furnished the loads:

| | |
|---------------------------|-------------------------|
| Tobiason Potato Co. | East Grand Forks, Minn. |
| John P. Bushee Potato Co. | East Grand Forks, Minn. |
| Amundson Brothers | East Grand Forks, Minn. |
| E. H. Abel | East Grand Forks, Minn. |
| R. C. Boelter | East Grand Forks, Minn. |
| Higgins Potato Co. | East Grand Forks, Minn. |
| Valley Produce Co. | Grand Forks, N. Dak. |

Members of the test party were:

Fred Fischer, Manager, Perishable Freight Traffic, Northern Pacific Railroad, St. Paul, Minnesota. East Grand Forks to Minneapolis.

Elmer Broderick, Traveling Freight Agent, Northern Pacific Railroad, Grand Forks, North Dakota. East Grand Forks to Minneapolis.

Robert Nelson, Traveling Freight Agent, Soo Line Railroad, East Grand Forks, Minnesota. East Grand Forks to Chicago.

W. O. Soberg, Trainmaster, Soo Line Railroad. Minneapolis to Stevens Point.

W. A. Taft, Trainmaster, Soo Line Railroad. Stevens Point to Chicago.

R. E. Hardenburg, Associate Horticulturist, United States Department of Agriculture, Beltsville, Maryland. East Grand Forks to Chicago.

W. H. Redit, Mechanical Engineer, United States Department of Agriculture, Beltsville, Maryland. East Grand Forks to Chicago.

J. M. Lutz, Sr. Physiologist, United States Department of Agriculture, East Grand Forks, Minnesota. East Grand Forks to Chicago.

FIGURE 1 - AVERAGE BOTTOM POTATO AND OUTSIDE AIR TEMPERATURES-NON-FAN CARS

- A. Paper under floor racks and up side (Standard N.P. practice)
- B. Wood fiber pad from outside stringer and up sidewall 18", also over door opening
- C. Blanket pad on floor rack

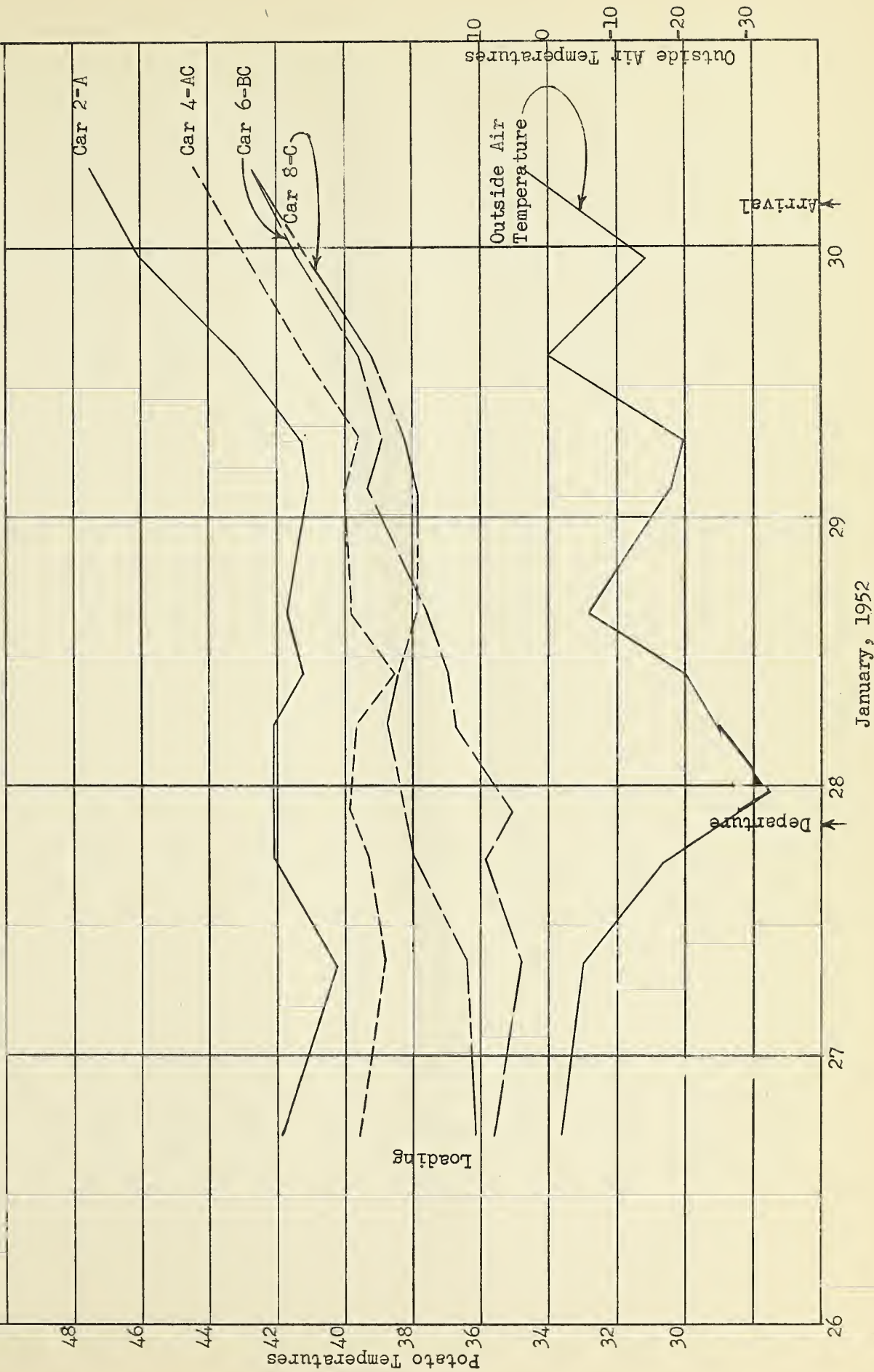


FIGURE 2-MINIMUM POTATO AND OUTSIDE AIR TEMPERATURES-NON-FAN CARS

- A. Paper under floor rack and sides (standard N.P. practice)
- B. Wood fiber pad from outside stringer and up side wall 18", also over door openings
- C. Blanket pads on floor rack

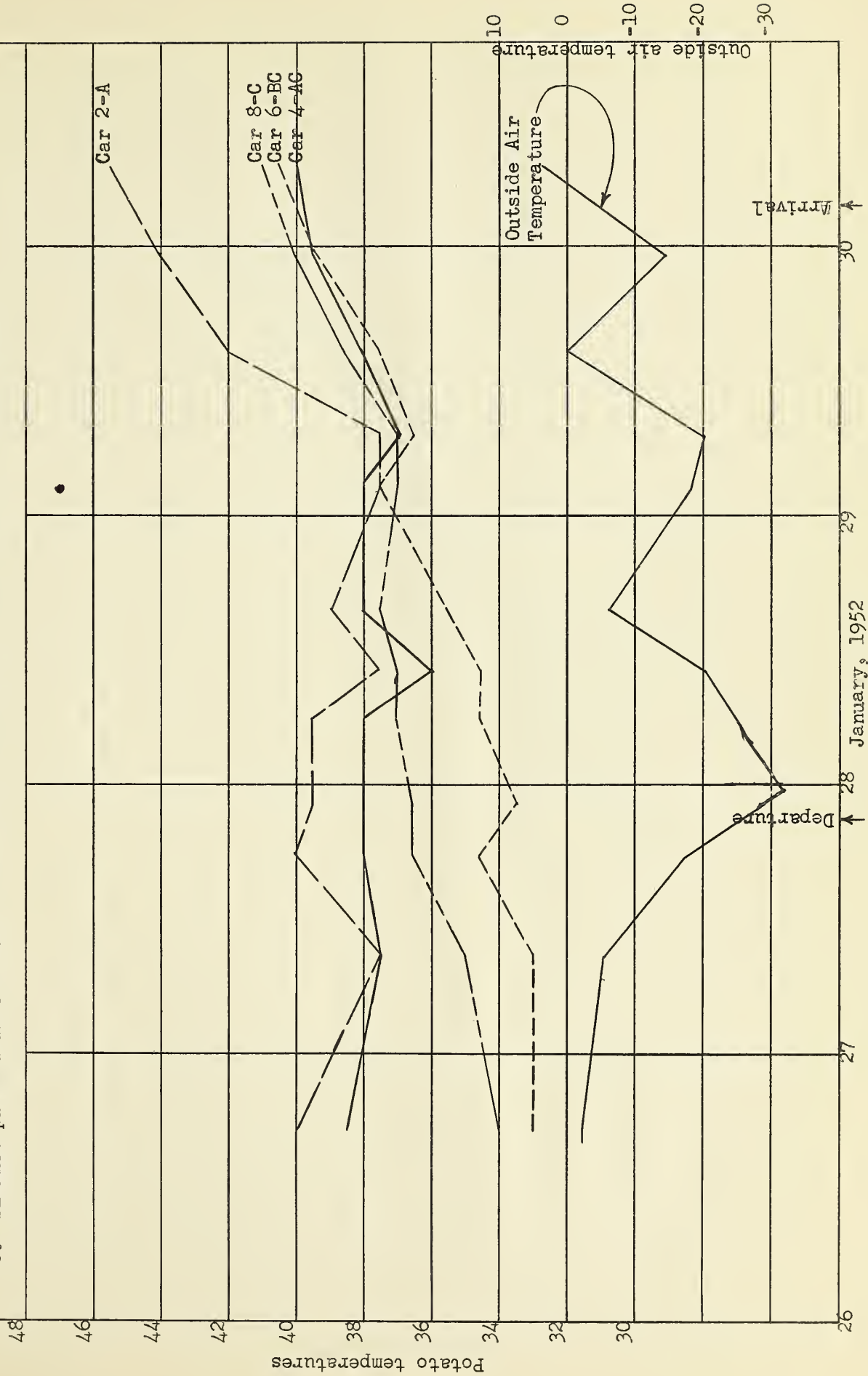
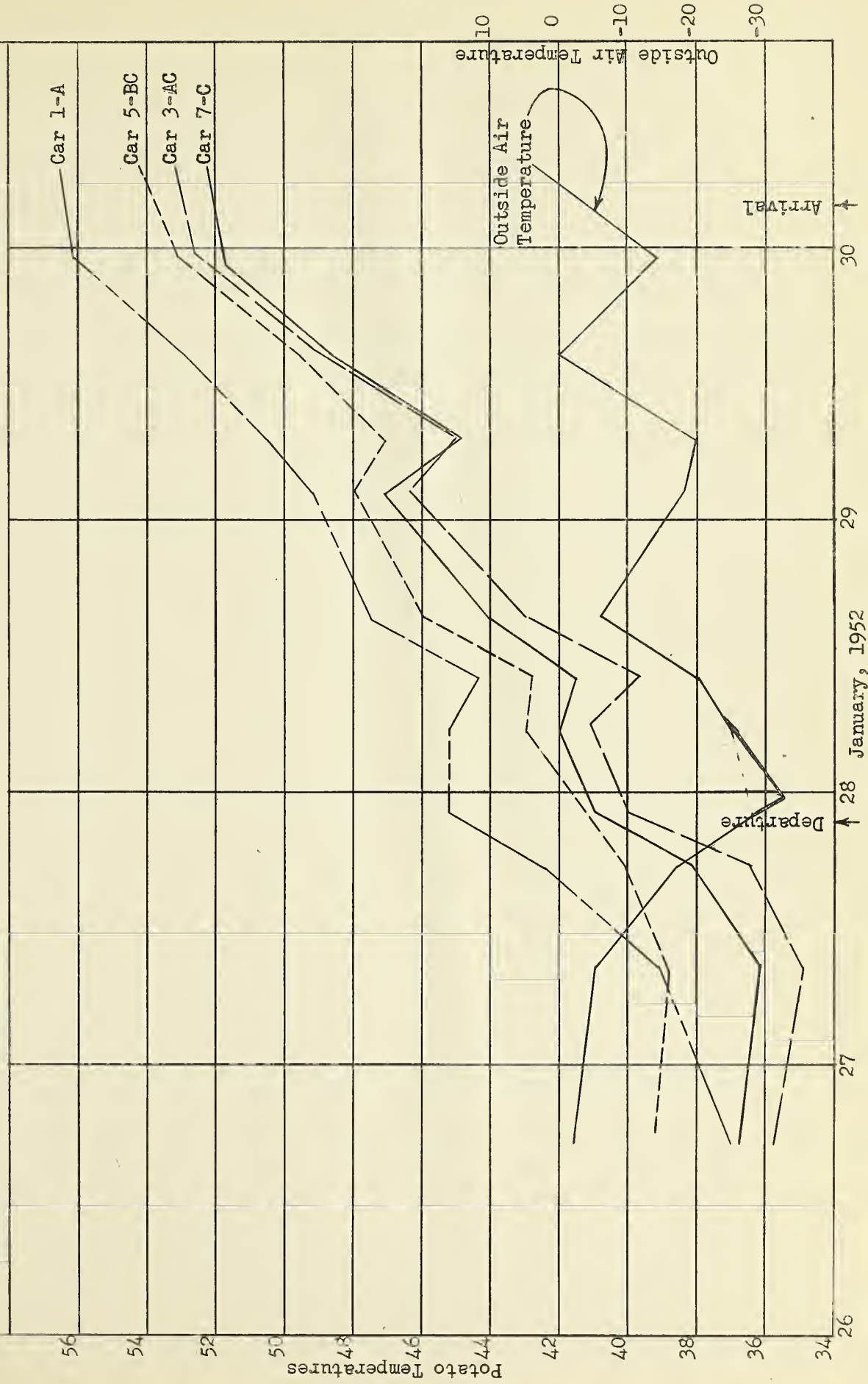


FIGURE 3-AVERAGE BOTTOM POTATO AND OUTSIDE AIR TEMPERATURE-FAN CARS

- A. Paper under floorracks and up side wall (standard N.P. practice)
- B. Wood fiber pad from outside slinger and up wall 18", also over door openings
- C. Blanket pad on floorrack



56

- A. Paper under racks and sides (standard N.P. practice)
- B. Wood fiber pad from outside stringer and up side wall 18"
- C. Blanket pad on floorrack

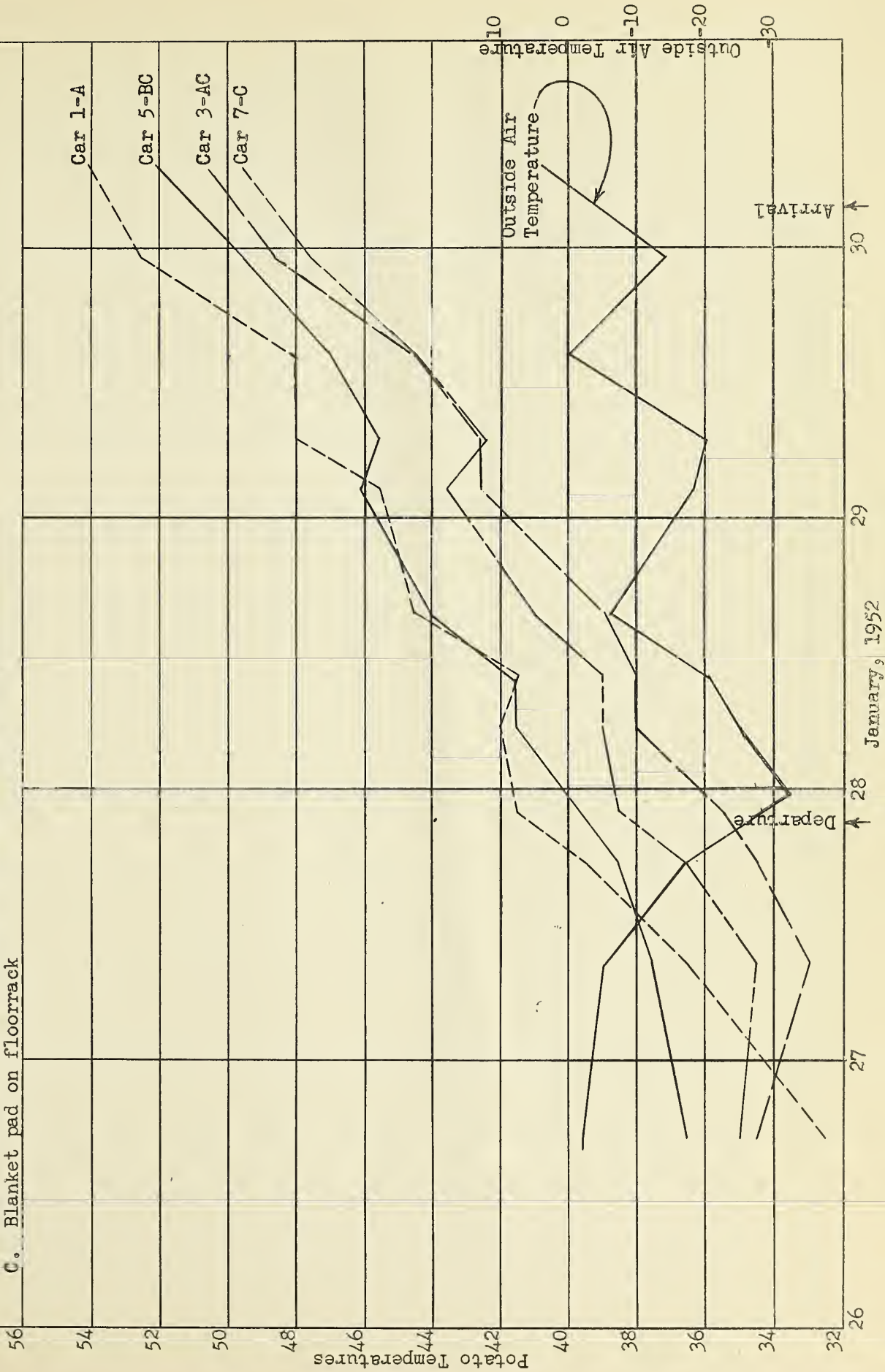


FIGURE 5-AVERAGE TOP AND BOTTOM TEMPERATURES IN FAN AND NON-FAN CARS

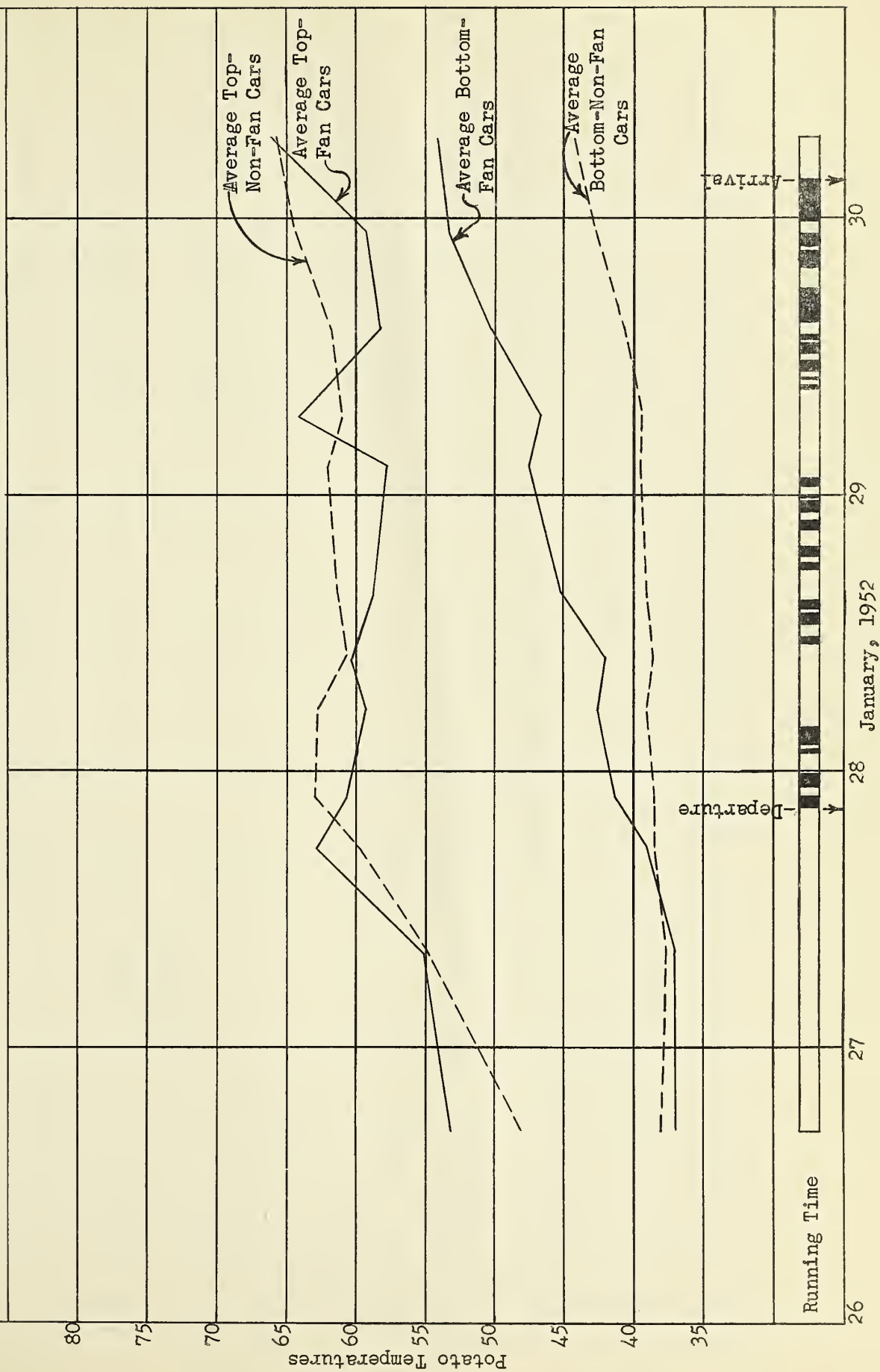


TABLE 1. LOADING DATA ON TEST CARS

| Car Number | Type of Car | Car Lining | Pads on Floor-racks | Load/ Pounds | Height of Load | Space Above Load | Sidewall Space (bottom layer) | Loading | | Average Temperatures | |
|-------------|-------------|-----------------------|--------------------------------|--------------|----------------|------------------|-------------------------------|---------|---------|----------------------|--------|
| | | | | | | | | Start | Finish | Outside | Potato |
| 1-NP 91476 | Fan | Paper2/ | none | 40,000 | 74 | 13 | 6 | 4:00PM | 4:45PM | OF -2 | 41 |
| 2-NRCL13128 | Non-Fan | " | " | 40,000 | 73 | 12 | 6 | 11:00AM | 11:30AM | -3 | 41 |
| 3-NP 91255 | Fan | " | 1/4 inch wood fiber blankets4/ | 40,000 | 74 | 13 | 6 | 10:20AM | 11:15AM | -3 | 37 |
| 4-NRCL13152 | Non-Fan | " | " | 40,000 | 73 | 12 | 6 | 1:05PM | 2:15PM | -2 | 39 |
| 5-NP 91262 | Fan | 1/4 inch wood fiber3/ | " | 45,000 | 87 | 0 | 6 | 11:15AM | 12:05PM | -3 | 40 |
| 6-NRCL14151 | Non-Fan | " | " | 36,000 | 68 | 19 | 6 | 1:10PM | 2:15PM | -2 | 37 |
| 7-NP 91072 | Fan | None | " | 40,000 | 75 | 12 | 6 | 9:00AM | 10:10AM | -4 | 40 |
| 8-NRCL17056 | Non-Fan | " | " | 40,000 | 79 | 8 | 4 | 11:00AM | 11:30AM | -2 | 36 |

1/ All cars loaded with potatoes in 100 pound bags.

2/ Heavy Kraft paper (about substance 60) underneath floor racks and up sidewalls about 36 inches, including the doorways. This is standard N.P. practice.

3/ A 24-inch strip of 1/4 inch, paper backed, "Tufflex" was placed along the floor from the outside floorrack stringers (approx. 6") to the wall and up the wall about 18 inches. Twelve-inch strips of this material were also used to cover the door openings in these 2 cars.

4/ Paper covered "Tufflex" blankets 28 x 88 inches laid crosswise of the car. These pads covered the floor racks to a distance of 5 to 6 inches from the wall. The paper covering of these pads was perforated with about 100 small holes per square foot.

TABLE 2.

Trip Log

| DATE | STATION | TIME | TIME | ELAPSED TIME | |
|---------|-------------------------|---------|----------|--------------|----------|
| | | ARRIVED | DEPARTED | HOURS | |
| | | | | RUNNING | STANDING |
| Jan. 27 | East Grand Forks, Minn. | -- | 8:55PM | | |
| | Crookston | 10:00PM | 10:45 | 1-05 | 0-45 |
| 28 | Fertile | 11:50 | 1:40AM | 1-05 | 1-50 |
| | Gary | 2:05AM | 2:30 | 0-25 | 0-25 |
| | Lake Park | 4:20 | 11:05 | 1-50 | 6-45 |
| | Detroit Lakes | 11:45 | 12:50PM | 0-40 | 1-05 |
| | New York Mills | 1:50PM | 2:10 | 1-00 | 0-20 |
| | Staples | 3:00 | 5:35 | 0-50 | 2-35 |
| | Philbrook | 6:15 | 6:40 | 0-40 | 0-25 |
| | Little Falls | 7:35 | 8:55 | 0-55 | 1-20 |
| | Sartell | 9:50 | 10:35 | 0-55 | 0-45 |
| | Big Lake | 11:35PM | 11:45 | 1-00 | 0-10 |
| 29 | Elk River | 12:00 | 12:45AM | 0-15 | 0-45 |
| | Minneapolis | 1:35AM | 9:15 | 0-50 | 7-40 |
| | New Brighton | 9:35 | 10:00 | 0-20 | 0-25 |
| | Cardigan Jct. | 10:15 | 10:45 | 0-15 | 0-30 |
| | New Richmond, Wisc. | 11:45 | 12:20PM | 1-00 | 0-35 |
| | Wheeler | 1:15PM | 1:30 | 0-55 | 0-15 |
| | Chippewa Falls | 2:00 | 3:00 | 0-30 | 1-00 |
| | Stevens Point | 6:00 | 7:40 | 3-00 | 1-40 |
| | Neenah | 9:15 | 9:30 | 1-35 | 0-15 |
| | Fond du Lac | 10:45 | 11:40 | 1-15 | 0-55 |
| 30 | Chicago, Ill. | 3:25AM | | 3-45 | |
| | | | TOTAL | 24-05 | 30-25 |

TABLE 3. AIR AND COMMODITY TEMPERATURES

CAR NO. 1. NP 91476 - FAN

| STATION | DATE Jan. | TIME | OST of | BBWS | | BDWS | | TQCL | | BBWS | | BDWS | | BQWS | | BDWS | | BDCL | | BBES | | POTATO | | POTATO AVE. TOPS BOT. | | |
|----------------|--------------|-----------------------|-----------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|------|------|------|------|---|--------|------|--------------------------------|--|--|
| | | | | AIR | AIR | AIR | AIR | H | R | H | R | H | R | H | R | H | R | H | R | R | R | MAX. | MIN. | | | |
| E. Grand Forks | 26 | | - 2 | | | | | | | | | | | | | | | | | | | | | | | |
| | | Loaded 4:00 - 4:45 PM | | | | | | | | | | | | | | | | | | | | | | | | |
| E. Grand Forks | 26 | 5:00P | - 2 | 370 | 365 | 465 | 450 | 370 | 360 | 430 | 360 | 415 | 340 | 370 | 325 | 46.5 | 32.5 | 45.8 | 37.1 | | | | | | | |
| E. Grand Forks | 27 | 8:30A | - 5 | 370 | 385 | 530 | 530 | 385 | 385 | 380 | 400 | 435 | 380 | 365 | 400 | 53.0 | 36.5 | 53.0 | 39.1 | | | | | | | |
| E. Grand Forks | 27 | 5:30P | -17 | 420 | 420 | 650 | 650 | 415 | 420 | 415 | 460 | 460 | 400 | 395 | 430 | 65.0 | 39.5 | 65.0 | 42.4 | | | | | | | |
| Crookston | 27 | 10:00P | -28 | 465 | 480 | 640 | 605 | 430 | 465 | 445 | 470 | 500 | 425 | 415 | 465 | 64.0 | 41.5 | 62.2 | 45.2 | | | | | | | |
| Lake Park | 28 | 5:30A | -25 | 440 | 440 | 620 | 580 | 445 | 440 | 445 | 470 | 500 | 425 | 420 | 470 | 62.0 | 42.0 | 60.0 | 45.2 | | | | | | | |
| Lake Park | 28 | 10:00A | -20 | 415 | 430 | 620 | 585 | 435 | 425 | 440 | 455 | 485 | 425 | 415 | 465 | 62.0 | 41.5 | 60.2 | 44.3 | | | | | | | |
| Staples | 28 | 3:30P | - 6 | 485 | 480 | 650 | 570 | 460 | 480 | 465 | 485 | 530 | 445 | 445 | 495 | 65.0 | 44.5 | 61.0 | 47.6 | | | | | | | |
| Minneapolis | 29 | 2:30A | -18 | 495 | 485 | -- | 580 | 465 | 480 | 485 | 525 | 545 | 455 | 465 | 520 | 58.0 | 45.5 | 58.0 | 49.2 | | | | | | | |
| Minneapolis | 29 | 7:00A | -20 | 505 | 490 | -- | 680 | 490 | 485 | 505 | 525 | 550 | 480 | 480 | 525 | 68.0 | 48.0 | 68.0 | 50.5 | | | | | | | |
| Chippewa Falls | 29 | 2:30P | 0 | 545 | 540 | -- | 580 | 480 | 535 | 525 | 565 | 580 | 495 | 495 | 565 | 58.0 | 48.0 | 58.0 | 53.0 | | | | | | | |
| Fond du Lac | 29 | 11:00P | -14 | 565 | 560 | -- | 585 | 525 | 560 | 565 | 585 | 620 | 525 | 525 | 585 | 62.0 | 52.5 | 58.5 | 56.1 | | | | | | | |
| Chicago, Ill. | 30 | 7:00A | 4 | 570 | 540 | -- | 680 | 545 | 540 | 570 | 585 | 605 | 545 | 545 | 585 | 68.0 | 54.0 | 68.0 | 56.5 | | | | | | | |

TABLE 4. AIR AND COMMODITY TEMPERATURES

| STATION | DATE | TIME | OST OF | BDWS | | TQCL | | BDWS | | BQWS | | BDCL | | BDES | | POTATO | | POTATO AVE. TOS BOTT. | |
|----------------|------|--------|-----------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|--------|------|--------------------------------|------|
| | | | | AIR | AIR | H | R | H | R | H | R | H | R | H | R | MAX. | MIN. | | |
| E. Grand Forks | 26 | | - 3 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| E. Grand Forks | 26 | 5:00P | - 2 | 435 | 415 | -- | 410 | 435 | 430 | 425 | 415 | 410 | 415 | -- | 400 | 43.5 | 40.0 | 41.0 | 41.9 |
| E. Grand Forks | 27 | 8:30A | - 5 | 430 | 390 | -- | 580 | 415 | 375 | 415 | 405 | 400 | 410 | 410 | 395 | 58.0 | 37.5 | 58.0 | 40.3 |
| E. Grand Forks | 27 | 5:30P | -17 | 450 | 415 | -- | 660 | 440 | 400 | 440 | 415 | 420 | 420 | 420 | 410 | 66.0 | 40.0 | 66.0 | 42.1 |
| Crockston | 27 | 10:00P | -28 | 455 | 410 | -- | 675 | 450 | 395 | 440 | 415 | 415 | 420 | 420 | 410 | 67.5 | 39.5 | 67.5 | 42.1 |
| Lake Park | 28 | 5:30A | -25 | 445 | 400 | -- | 655 | 450 | 395 | 440 | 415 | 415 | 420 | 425 | 410 | 65.5 | 39.5 | 65.5 | 42.1 |
| Lake Park | 28 | 10:00A | -20 | 425 | 390 | -- | 620 | 430 | 375 | 430 | 410 | 415 | 420 | 420 | 405 | 62.0 | 37.5 | 62.0 | 41.3 |
| Staples | 28 | 3:30P | - 6 | 450 | 400 | -- | 630 | 420 | 390 | 440 | 415 | 415 | 420 | 430 | 405 | 63.0 | 39.0 | 63.0 | 41.7 |
| Minneapolis | 29 | 2:30A | -18 | 440 | 385 | -- | 615 | 410 | 375 | 440 | 415 | 410 | 420 | -- | 410 | 61.5 | 37.5 | 61.5 | 41.1 |
| Minneapolis | 29 | 7:00A | -20 | 425 | 385 | -- | 615 | 410 | 375 | 435 | 410 | 410 | 420 | 440 | 405 | 61.5 | 37.5 | 61.5 | 41.3 |
| Chippewa Falls | 29 | 2:30P | 0 | 465 | 415 | -- | 615 | 450 | 420 | 445 | 420 | 435 | 425 | 440 | 425 | 61.5 | 42.0 | 61.5 | 43.2 |
| Fond du Lac | 29 | 11:00P | -14 | 485 | 440 | -- | 635 | 490 | 475 | 465 | 440 | 455 | 455 | 460 | 450 | 63.5 | 44.0 | 63.5 | 46.1 |
| Chicago, Ill. | 30 | 7:00A | 4 | 485 | 450 | -- | 650 | 495 | 490 | 480 | 455 | 465 | 470 | 480 | 470 | 65.0 | 45.5 | 65.0 | 47.6 |

Paper under floor racks
Blanket Pads on floor racks

TABLE 5. AIR AND COMMODITY TEMPERATURES

CAR NO. 3. NP 91255 - FAN

| STATION | DATE TIME Jan. | OST °F | BBWS | | BDWS | TQCL | | BBWS | | BDWS | | BQWS | | BDCL | | BDES | POTATO | | POTATO AVE. BOT. |
|----------------|-------------------|-----------|-------------------------|-----|------|------|-----|------|-----|------|-----|------|-----|------|------|------|--------|------|---------------------|
| | | | AIR | AIR | | H | R | H | R | H | R | R | R | MAX. | MIN. | | TOPS | | |
| E. Grand Forks | 25 | - 3 | | | | | | | | | | | | | | | | | |
| | | | Loaded 10:20 - 11:15 AM | | | | | | | | | | | | | | | | |
| E. Grand Forks | 26 5:00P | - 2 | 370 | 375 | 560 | 560 | 390 | 350 | 360 | 350 | 355 | 345 | 365 | 350 | 56.0 | 34.5 | 56.0 | 35.8 | |
| E. Grand Forks | 27 8:30A | - 5 | 350 | 360 | 555 | 540 | 365 | 355 | 330 | 350 | 355 | 345 | 340 | 355 | 55.5 | 33.0 | 54.8 | 34.9 | |
| E. Grand Forks | 27 5:30P | -17 | 380 | 385 | 615 | 605 | 385 | 365 | 355 | 365 | 375 | 345 | 355 | 365 | 61.5 | 34.5 | 61.0 | 36.4 | |
| Crookston | 27 10:00P | -28 | 405 | 445 | 595 | 595 | 390 | 395 | 385 | 375 | 420 | 355 | 385 | 405 | 59.5 | 35.5 | 59.5 | 38.9 | |
| Lake Park | 28 5:30A | -25 | 405 | 425 | 595 | 585 | 405 | 435 | 405 | 385 | 445 | 380 | 390 | 425 | 59.5 | 38.0 | 59.0 | 40.9 | |
| Lake Park | 28 10:00A | -20 | 395 | 400 | 595 | 615 | 405 | 415 | 380 | 385 | 415 | 380 | 380 | 405 | 61.5 | 38.0 | 60.5 | 39.6 | |
| Staples | 28 3:30P | - 6 | 435 | 460 | 575 | 565 | 430 | 455 | 430 | 405 | 455 | 390 | 410 | 450 | 57.5 | 39.0 | 57.0 | 42.8 | |
| Minneapolis | 29 2:30A | -18 | 465 | 485 | 575 | 575 | 455 | 490 | 465 | 445 | 500 | 425 | 440 | 485 | 57.5 | 42.5 | 57.5 | 46.3 | |
| Minneapolis | 29 7:00A | -20 | 455 | 455 | 645 | 645 | 455 | 475 | 435 | 440 | 475 | 425 | 425 | 470 | 64.5 | 42.5 | 64.5 | 45.0 | |
| Chippewa Falls | 29 2:30P | 0 | 505 | 530 | 595 | -- | 475 | 515 | 505 | 475 | 530 | 445 | 465 | 515 | 59.5 | 44.5 | 59.5 | 49.1 | |
| Fond du Lac | 29 11:00P | -14 | 545 | 555 | 600 | 620 | 505 | 545 | 540 | 510 | 565 | 485 | 495 | 555 | 62.0 | 48.5 | 61.0 | 52.5 | |
| Chicago, Ill. | 30 7:00A | 4 | 530 | 530 | 660 | 685 | 525 | 550 | 525 | 520 | 555 | 505 | 505 | 560 | 68.5 | 50.5 | 67.2 | 53.1 | |

Paper under floor racks
Blanket Pads on floor racks

TABLE 6. AIR AND COMMODITY TEMPERATURES

CAR NO. 4. NRC 13152 - NON-FAN

| STATION | DATE | TIME | OST | OF | Loaded 1:05 - 2:15 PM | | | | | | | | | | POTATO | | POTATO | | TOPS | AVE. | BOTT. |
|----------------|------|--------|-----|----|-----------------------|------|----|-----|-----|------|-----|-----|------|-----|--------|------|--------|------|------|------|-------|
| | | | | | Air | BDWS | H | R | H | BDWS | H | R | BDWS | H | R | BDWS | H | R | | | |
| E. Grand Forks | 26 | | - 2 | | | | | | | | | | | | | | | | | | |
| E. Grand Forks | 26 | 5:00P | - 5 | | 420 | 420 | -- | 545 | 390 | 405 | 410 | 390 | 400 | 390 | 385 | 390 | 54.5 | 38.5 | 54.5 | 39.5 | |
| E. Grand Forks | 27 | 8:30A | - 2 | | 405 | 370 | -- | 580 | 390 | 395 | 400 | 375 | 385 | 390 | 375 | 395 | 58.0 | 37.5 | 58.0 | 38.8 | |
| E. Grand Forks | 27 | 5:30P | -17 | | 415 | 390 | -- | 605 | 400 | 405 | 405 | 380 | 395 | 390 | 380 | 385 | 60.5 | 38.0 | 60.5 | 39.2 | |
| Crookston | 27 | 10:00P | -28 | | 420 | 380 | -- | 625 | 400 | 400 | 435 | 380 | 390 | 390 | 395 | 395 | 62.5 | 38.0 | 62.5 | 39.8 | |
| Lake Park | 28 | 5:30A | -25 | | 415 | 360 | -- | 625 | 400 | 400 | 415 | 410 | 380 | 390 | 385 | 395 | 62.5 | 38.0 | 62.5 | 39.7 | |
| Lake Park | 28 | 10:00A | -20 | | 400 | 360 | -- | 610 | 390 | 400 | 395 | 365 | 375 | 405 | 360 | 395 | 61.0 | 36.0 | 61.0 | 38.6 | |
| Staples | 28 | 3:30P | - 6 | | 430 | 380 | -- | 620 | 405 | 405 | 415 | 380 | 385 | 395 | 395 | 405 | 62.0 | 38.0 | 62.0 | 39.8 | |
| Minneapolis | 29 | 2:30A | -18 | | 435 | 370 | -- | 640 | 410 | 410 | 400 | 380 | 380 | 395 | 405 | 420 | 64.0 | 38.0 | 64.0 | 40.0 | |
| Minneapolis | 29 | 7:00A | -20 | | 415 | 360 | -- | 625 | 400 | 410 | 415 | 370 | 380 | 390 | 385 | 420 | 62.5 | 37.0 | 62.5 | 39.6 | |
| Chippewa Falls | 29 | 2:30P | 0 | | 455 | 400 | -- | 655 | 425 | 425 | 425 | 380 | 390 | 400 | 425 | 425 | 65.5 | 38.0 | 65.5 | 41.2 | |
| Fond du Lac | 29 | 11:00P | -14 | | 470 | 400 | -- | 695 | 450 | 445 | 450 | 395 | 400 | 415 | 430 | 445 | 69.5 | 39.5 | 69.5 | 42.9 | |
| Chicago, Ill. | 30 | 7:00A | 4 | | 470 | 420 | -- | 695 | 460 | 460 | 475 | 400 | 410 | 425 | 460 | 465 | 69.5 | 40.0 | 69.5 | 44.4 | |

"Tufflex" strip where floor of car
joins side wall and over door opening.
Blanket Pads on floor racks.

TABLE 7. AIR AND COMMODITY TEMPERATURES

CAR NO. 5. NP 91262 - FAN

| STATION | DATE | TIME | OST | BBWS | | BDWS | | TQCL | | BBWS | | BDWS | | BQWS | | BDCL | | BBES | | POTATO | | POTATO |
|----------------|------|--------|-----|----------------------------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|------|------|------|--------|-------|--------|
| | | | | Air | Air | H | H | R | R | H | H | R | R | R | R | R | R | MAX. | MIN. | AVE. | TOPS. | |
| E. Grand Forks | 26 | | - 3 | | | | | | | | | | | | | | | | | | | |
| | | | | Loaded 11:15 AM - 12:05 PM | | | | | | | | | | | | | | | | | | |
| E. Grand Forks | 26 | 5:00P | - 2 | 400 | 405 | 480 | 550 | 385 | 400 | 405 | 365 | 375 | 380 | 415 | 410 | 55.0 | 36.5 | 51.5 | 39.2 | | | |
| E. Grand Forks | 27 | 8:30A | - 5 | 400 | 405 | 515 | 555 | 375 | -- | 405 | 375 | 380 | 385 | 390 | 405 | 55.5 | 37.5 | 53.5 | 38.8 | | | |
| E. Grand Forks | 27 | 5:30P | -17 | 415 | 430 | 565 | 610 | 385 | -- | 420 | 385 | 400 | 395 | 395 | 420 | 61.0 | 38.5 | 58.8 | 40.0 | | | |
| Crookston | 27 | 10:00P | -28 | 435 | 450 | 575 | 585 | 395 | -- | 425 | 405 | 410 | 400 | 410 | 435 | 58.5 | 39.5 | 58.0 | 41.1 | | | |
| Lake Park | 28 | 5:30A | -25 | 445 | 450 | 580 | 595 | 420 | -- | 440 | 425 | 430 | 415 | 435 | 445 | 59.5 | 41.5 | 58.8 | 43.0 | | | |
| Lake Park | 28 | 10:00A | -20 | 440 | 440 | 580 | 610 | 415 | -- | 445 | 420 | 425 | 420 | 425 | 445 | 61.0 | 41.5 | 59.5 | 42.8 | | | |
| Staples | 28 | 3:30P | - 6 | 475 | 485 | 575 | 585 | 450 | 470 | 455 | 440 | 470 | 475 | 450 | 470 | 58.5 | 44.0 | 58.0 | 46.0 | | | |
| Minneapolis | 29 | 2:30A | -18 | 495 | 505 | 580 | 585 | 475 | -- | 480 | 465 | 505 | 460 | 475 | 495 | 58.5 | 46.0 | 58.2 | 47.9 | | | |
| Minneapolis | 29 | 7:00A | -20 | 485 | 490 | 620 | 630 | 460 | -- | 485 | 460 | 480 | 455 | 470 | 490 | 63.0 | 45.5 | 62.5 | 47.1 | | | |
| Chippewa Falls | 29 | 2:30P | 0 | 510 | 530 | 590 | 580 | 500 | -- | 490 | 480 | 525 | 470 | 495 | 515 | 59.0 | 47.0 | 58.5 | 49.6 | | | |
| Fond du Lac | 29 | 11:00P | -14 | 530 | 560 | 605 | 585 | 540 | -- | 525 | 505 | 555 | 495 | 535 | 555 | 60.5 | 49.5 | 59.5 | 53.0 | | | |
| Chicago, Ill. | 30 | 7:00A | 4 | 550 | 555 | 665 | 655 | 545 | -- | 545 | 525 | 555 | 520 | 545 | 560 | 66.5 | 52.0 | 66.0 | 54.2 | | | |

"Tufflex" strips where floor of car
joins sidewall and over door openings.
Blanket Pads on floor racks

TABLE 8. AIR AND COMMODITY TEMPERATURES

CAR NO. 6. NRC 14151 - NON-FAN

| STATION | DATE | TIME | OST Of | Loaded 1:10 - 2:15 PM | | | | | | | | | | POTATO | | POTATO AVE. TOPS. BOT. | | | |
|----------------|------|--------|-----------|-----------------------|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------|------------------------------|------|------|------|
| | | | | BBWS Air | BDWS | TQCL H | BBWS H | BDWS H | BBWS R | BQWS R | BDWS R | BDCL R | BBES R | BDES R | MAX. | | MIN. | | |
| E. Grand Forks | 26 | | - 2 | | | | | | | | | | | | | | | | |
| E. Grand Forks | 26 | 5:00P | - 2 | 375 | 355 | 495 | 465 | 380 | 355 | 365 | 370 | 340 | 330 | 370 | 335 | 49.5 | 33.0 | 48.0 | 35.6 |
| E. Grand Forks | 27 | 8:30A | - 5 | 355 | 345 | 460 | 445 | 370 | 345 | 350 | 350 | 330 | 345 | 345 | -- | 46.0 | 33.0 | 45.2 | 34.8 |
| E. Grand Forks | 27 | 5:30P | -17 | 350 | 370 | 520 | 490 | 380 | 365 | 355 | 365 | 345 | 350 | 360 | 355 | 52.0 | 34.5 | 50.5 | 35.9 |
| Crookston | 27 | 10:00P | -28 | 375 | 365 | 580 | 545 | 345 | 345 | 355 | 365 | 335 | 345 | 365 | 365 | 58.0 | 33.5 | 56.2 | 35.2 |
| Lake Park | 28 | 5:30A | -25 | 380 | 370 | 575 | 545 | 385 | 360 | 370 | 370 | 345 | 360 | 380 | 365 | 57.5 | 34.5 | 56.0 | 36.7 |
| Lake Park | 28 | 10:00A | -20 | 385 | 365 | 560 | 545 | 385 | 360 | 375 | 375 | 345 | 365 | 380 | 370 | 56.0 | 34.5 | 55.2 | 36.9 |
| Staples | 28 | 3:30P | - 6 | 390 | 385 | 595 | 570 | 390 | 365 | 375 | 380 | 355 | 370 | 380 | 385 | 59.5 | 35.5 | 58.2 | 37.5 |
| Minneapolis | 29 | 2:30A | -18 | 405 | 405 | 625 | 610 | 405 | 385 | 395 | 390 | 375 | 385 | 400 | 410 | 62.5 | 37.5 | 61.8 | 39.3 |
| Minneapolis | 29 | 7:00A | -20 | 400 | 385 | 605 | 590 | 405 | 385 | 395 | 395 | 365 | 385 | 395 | 390 | 60.5 | 36.5 | 59.8 | 38.9 |
| Chippewa Falls | 29 | 2:30P | 0 | 425 | 415 | 610 | 595 | 415 | 380 | 395 | 400 | 375 | 385 | 410 | 405 | 61.0 | 37.5 | 60.2 | 39.6 |
| Fond du Lac | 29 | 11:00P | -14 | 440 | 430 | 640 | 635 | 425 | 395 | 420 | 420 | 395 | 400 | 430 | 425 | 64.0 | 39.5 | 63.8 | 41.4 |
| Chicago, Ill. | 30 | 7:00A | 4 | 445 | 445 | 670 | 650 | 445 | 405 | 435 | 430 | 405 | 410 | 445 | 445 | 67.0 | 40.5 | 66.0 | 42.8 |

TABLE 9. AIR AND COMMODITY TEMPERATURES

CAR NO. 7. NP 91072 - FAN

| STATION | DATE TIME Jan. | OST OF | BBWS BDWS | | TQCL | | BBWS BDWS | | TQCL | | BBWS BDWS | | TQCL | | BDCL BBES BDES | | POTATO | | POTATO AVE. TOPS AVE. BOT. |
|----------------|-------------------|-----------|-----------|-----|------------------------|-----|-----------|-----|------|-----|-----------|-----|------|-----|----------------|-----|--------|------|----------------------------------|
| | | | Air | Air | H | R | H | H | R | R | R | R | H | R | R | R | MAX. | MIN. | |
| E. Grand Forks | 26 | - 4 | | | Loaded 9:00 - 10:10 AM | | | | | | | | | | | | | | |
| E. Grand Forks | 26 5:00P | - 2 | 375 | 380 | 590 | 600 | 375 | 350 | 365 | 360 | 360 | 360 | 360 | 360 | 385 | 385 | 60.0 | 35.0 | 59.5 36.8 |
| E. Grand Forks | 27 8:30A | - 5 | 365 | 370 | 590 | 610 | 355 | 370 | 345 | 360 | 355 | 365 | 365 | 365 | 375 | 375 | 61.0 | 34.5 | 60.0 36.1 |
| E. Grand Forks | 27 5:30P | -17 | 385 | 395 | 650 | 670 | 385 | 395 | 365 | 380 | 385 | 370 | 380 | 380 | 390 | 390 | 67.0 | 36.5 | 66.0 38.1 |
| Crookston | 27 10:00P | -28 | 405 | 440 | 620 | 650 | 385 | 435 | 400 | 410 | 415 | 420 | 420 | 420 | 420 | 420 | 65.0 | 38.5 | 63.5 40.9 |
| Lake Park | 28 5:30A | -25 | 410 | 410 | 580 | 595 | 405 | 450 | 420 | 415 | 430 | 425 | 390 | 420 | 420 | 420 | 59.5 | 39.0 | 58.8 41.9 |
| Lake Park | 28 10:00A | -20 | 405 | 395 | 595 | 610 | 405 | 435 | 405 | 450 | 420 | 420 | 390 | 420 | 400 | 400 | 61.0 | 39.0 | 60.2 41.6 |
| Staples | 28 3:30P | - 6 | 430 | 450 | 580 | 590 | 425 | 475 | 425 | 440 | 450 | 450 | 410 | 445 | 445 | 445 | 59.0 | 41.0 | 58.5 44.0 |
| Minneapolis | 29 2:30A | -18 | 460 | 465 | 575 | 570 | 450 | 505 | 465 | 460 | 490 | 480 | 435 | 475 | 475 | 475 | 57.5 | 43.5 | 57.2 47.0 |
| Minneapolis | 29 7:00A | -20 | 440 | 440 | 610 | 610 | 450 | 475 | 430 | 445 | 465 | 465 | 425 | 440 | 440 | 440 | 61.0 | 42.5 | 61.0 44.9 |
| Chippewa Falls | 29 2:30P | 0 | 475 | 505 | 580 | 570 | 470 | 520 | 480 | 490 | 500 | 490 | 445 | 500 | 500 | 500 | 58.0 | 44.5 | 57.5 48.7 |
| Fond du Lac | 29 11:00P | -14 | 510 | 515 | 590 | 570 | 505 | 555 | 510 | 525 | 535 | 510 | 475 | 530 | 530 | 530 | 59.0 | 47.5 | 58.0 51.8 |
| Chicago, Ill. | 30 7:00A | 4 | 515 | 510 | 635 | 625 | 520 | 550 | 515 | 525 | 530 | 525 | 495 | 520 | 520 | 520 | 63.5 | 49.5 | 63.0 52.2 |

TABLE 10. AIR AND COMMODITY TEMPERATURES

CAR NO. 8. NRC 17056 - NON-FAN

| STATION | DATE | TIME | OST | BBWS | | TQCL | | BBWS | | BDWS | | BDCL | | BBES | | BDES | POTATO | | POTATO |
|---------|------|------|-----|------|-----|------|---|------|---|------|---|------|---|------|------|------|--------|--|--------|
| | | | | Air | Air | H | R | H | R | H | R | R | R | MAX. | MIN. | | AVE. | | |
| Jan. | | | OF | | | | | | | | | | | | | | | | |
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TABLE II. HEATER RECORDS AND INSPECTION OF DRAINS AT CHICAGO

| STATION | DATE TIME | OST | REMARKS | CAR NO. 1 NP 91476 HEAD REAR | CAR NO. 2 NRC 13128 HEAD REAR | CAR NO. 3 NP 91255 HEAD REAR | CAR NO. 4 NRC 13152 HEAD REAR | CAR NO. 5 NP 91262 HEAD REAR | CAR NO. 6 NRC 14151 HEAD REAR | CAR NO. 7 NP 91072 HEAD REAR | CAR NO. 8 NRC 17096 HEAD REAR |
|----------------|---|-----|-----------------------------|------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|
| E. Grand Forks | 25 3:00P | | N.P. Heater Numbers | 6263 6927 | 6532 7565 | 6611 8302 | 9176 7950 | 6994 8427 | 9152 8358 | 8799 7236 | 6123 8259 |
| E. Grand Forks | 26 8:00A | - 6 | Heaters Serviced | | | | | | | | |
| E. Grand Forks | 26 6:00P | - 4 | Do | | | | | | | | |
| E. Grand Forks | 27 6:00A | - 5 | Do | | | | | | | | |
| E. Grand Forks | 27 3:30P | -10 | Heaters serviced and filled | | | | | | | | |
| E. Grand Forks | 27 7:30P | -24 | Fuel Added Pounds: | 2 4 | 2 3 | 3 2 | 2 2 | 2 3 | 2 4 | 2 3 | 2 2 |
| Staples | 28 4:30P | - 6 | Fuel Added Pounds: | 10 10 | Heat- er out reli- 6 | 8 10 | 10 10 | 15 10 | 10 20 | 10 12 | 10 10 |
| Minneapolis | 29 7:00A | -20 | Fuel remaining. Pounds: | 8 8 | 10 10 | 10 8 | 14 12 | 10 12 | 10 10 | 8 12 | 10 16 |
| | Fuel burned January 27-3:30P to Jan. 29-7:00A | | Per Heater: | 24 26 | 13 21 | 23 24 | 18 24 | 27 21 | 22 28 | 24 23 | 22 16 |
| | | | Per Car: | 50 | 34 | 47 | 42 | 48 | 50 | 47 | 38 |
| Minneapolis | 29 7:00A | -20 | Soo Heaters Installed | | | | | | | | |
| | | | Heater No. | 6528 5938 | 6117 5948 | 6325 6245 | 6307 5026 | 3092 6463 | 2280 2551 | 5546 5406 | 6262 6546 |
| | | | Fuel in Heaters | | | | | | | | |
| | | | Pounds: | 20 20 | 20 30 | 20 20 | 20 30 | 30 20 | 30 30 | 20 20 | 20 20 |
| Chicago | 30 5:00A | 0 | Fuel Added Pounds 2/: | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | Condition of drains in Chicago: | | | Iced Up | Plugged With Waste | Open | Open | Iced Up | Plugged With Waste | Iced Up | Plugged With Hairfelt |

1/ Heaters installed and lit January 25 - 3:00 PM.

2/2/ Soo Line Heater man reported adding approximately 25 pounds fuel per car to fill heaters.

